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Operating instructions

Hydraulic excavator
R 954 C with long reach demolition attachment

from serial number 17856

Document identification

Order number: 10101988 Demolition

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Author: LFR - Technical documentation department

Product identification

Manufacturer: LIEBHERR France S.A.S.

Type: R 954 C with long reach demolition attachment

Type no.: 780 / 781 / 783 / 784 / 785 / **976** / 1016 / 1081

Conformity: CE

Address

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LFR/en/Edition: 10 / 2006

1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and descriptions of the components shown.

1.1.1 Machine with backhoe attachment

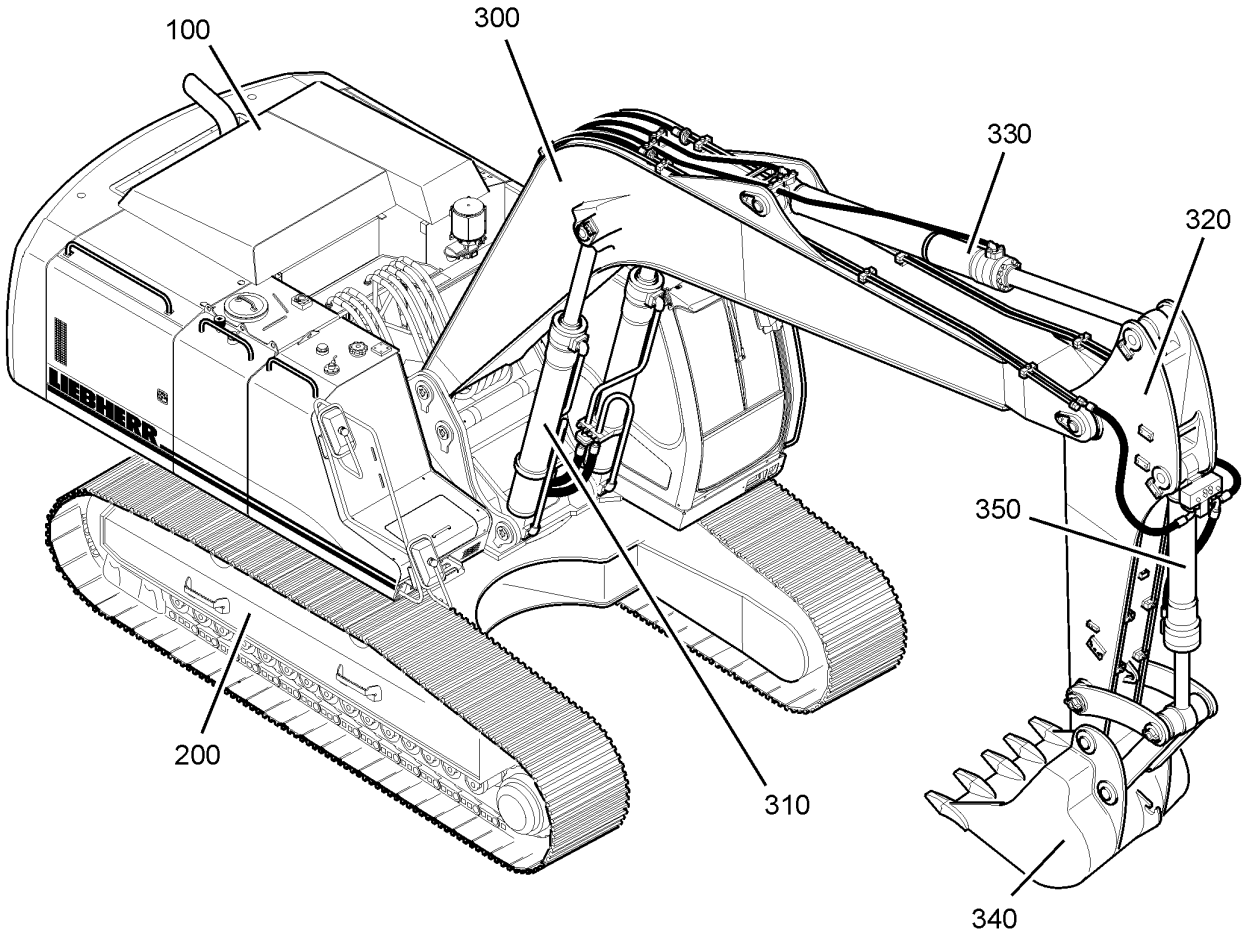

Fig. 1-1 *Machine with backhoe attachment*

100	Uppercarriage	**310**	Boom cylinder	**340**	Bucket
200	Undercarriage	**320**	Stiel	**350**	Bucket cylinder
300	Boom	**330**	Stiel cylinder		

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Reliability

The high demand for performance and quality is consequently converted into landmark solutions to achieve the highest level of dependability and availability. Liebherr has 50 years experience in the production of hydraulic excavators and has an unparalleled competence in design and know-how.

Technology with a vision

Optimized hydraulics

External bypass lines at the control valve apply the oil flow to the appropriate attachment functions. The optimal hose routing from the control valve to the attachment substantially increases the dependability of the hydraulic system.

Power pack

The individual components of the drive unit (i.e. construction equipment engine, travel and swing gearboxes, main pumps and hydraulic cylinders), produced by sister companies of Liebherr are coordinated to fit each other perfectly. They guarantee maximum dependability as an integral part of the total system which is designed for long life expectancy.

Quality to the last detail

The clearly laid out routing of the hydraulic, lubrication and electrical lines assures the highest reliability and performance of the machine. Optimal corrosion protection is achieved with pre-painted and surface-treated parts.

Heavy-duty attachments with long-term advantage

Robust attachment concept

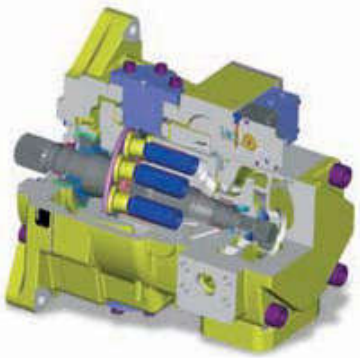
With the utilization of steel castings at every pivot point, the attachment is consistently able to withstand the most server demands.

Optimized stress flow

The swing ring tower is made from one piece, which transfers the forces – following the principal of “stress flow design” - into the undercarriage. For lasting protection against dirt and damage, Liebherr swing rings are sealed and have internal teeth.

Bucket linkage

- Optional sealed linkage bearings
- Optimal protection for under-water work
- Increased life expectancy of the attachment



Key components made by Liebherr

- Decades of experience with the development, design and manufacturing of components
- Engines, hydraulic pumps and motors, swing and travel gearboxes as well as electronic elements from in-house production
- Manufacturing centers for components in Germany and Switzerland produce according to the latest production methods

Lift Capacities

with Gooseneck Boom 7,60 m

Stick 2,35 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD				7,9# (7,9#)	6,6# (6,6#)			
6,0	HD				8,6# (8,6#)	6,6 (7,7#)			
4,5	HD		18,4# (18,4#)	12,3# (12,3#)	8,6 (9,7#)	6,2 (8,2#)			
3,0	HD			11,0 (14,3#)	7,9 (10,8#)	5,8 (8,8#)	4,3 (7,3#)		
1,5	HD			10,1 (15,5#)	7,3 (11,6#)	5,5 (9,4#)	4,1 (7,3)		
0	HD		10,9# (10,9#)	9,7 (15,9#)	6,9 (12,1#)	5,2 (9,1)			
- 1,5	HD	11,5# (11,5#)	15,8 (18,2#)	9,6 (15,6#)	6,8 (12,0)	5,1 (9,0)			
- 3,0	HD	18,7# (18,7#)	16,1 (18,7#)	9,8 (14,6#)	6,9 (11,4#)	5,2 (8,9#)			
- 4,5	HD	20,4# (20,4#)	16,2# (16,2#)	10,2 (12,7#)	7,2 (9,9#)				
- 6,0	HD		12,0# (12,0#)	9,3# (9,3#)					
- 7,5	HD								
- 9,0	HD								
-10,5	HD								

Stick 2,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD					6,7# (6,7#)			
6,0	HD				7,9# (7,9#)	6,6 (7,1#)	4,3# (4,3#)		
4,5	HD		16,1# (16,1#)	11,3# (11,3#)	8,7 (9,0#)	6,3 (7,7#)	4,5 (6,9#)		
3,0	HD		11,2# (11,2#)	11,3 (13,4#)	8,0 (10,2#)	5,8 (8,4#)	4,3 (7,3#)		
1,5	HD		8,4# (8,4#)	10,3 (15,0#)	7,3 (11,2#)	5,4 (9,0#)	4,1 (7,2)		
0	HD		11,8# (11,8#)	9,7 (15,7#)	6,9 (11,8#)	5,1 (9,1)	3,9 (7,0)		
- 1,5	HD	10,3# (10,3#)	15,5 (16,8#)	9,5 (15,7#)	6,7 (11,9)	5,0 (8,9)	3,9 (7,0)		
- 3,0	HD	15,9# (15,9#)	15,8 (19,9#)	9,6 (15,0#)	6,7 (11,6#)	5,0 (8,9)			
- 4,5	HD	21,9# (21,9#)	16,3 (17,6#)	9,9 (13,5#)	6,9 (10,4#)				
- 6,0	HD	18,2# (18,2#)	13,9# (13,9#)	10,5 (10,7#)					
- 7,5	HD								
- 9,0	HD								
-10,5	HD								

Stick 3,80 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD					5,7# (5,7#)	4,0# (4,0#)		
6,0	HD					6,2# (6,2#)	4,8 (5,8#)		
4,5	HD				7,9# (7,9#)	6,4 (6,8#)	4,6 (6,2#)		
3,0	HD		17,7# (17,7#)	11,9# (11,9#)	8,3 (9,2#)	5,9 (7,6#)	4,3 (6,6#)	3,1 (3,3#)	
1,5	HD		13,0# (13,0#)	10,7 (13,9#)	7,5 (10,4#)	5,5 (8,4#)	4,1 (7,1#)	3,0 (3,6#)	
0	HD	4,9# (4,9#)	12,6# (12,6#)	9,9 (15,2#)	7,0 (11,3#)	5,1 (9,0#)	3,8 (7,0)		
- 1,5	HD	8,8# (8,8#)	15,3# (15,3#)	9,5 (15,6#)	6,6 (11,8#)	4,9 (8,8)	3,7 (6,8)		
- 3,0	HD	12,8# (12,8#)	15,4 (19,5#)	9,4 (15,4#)	6,5 (11,7#)	4,8 (8,7)	3,7 (6,8)		
- 4,5	HD	17,4# (17,4#)	15,7 (19,4#)	9,5 (14,4#)	6,6 (11,1#)	4,9 (8,6#)			
- 6,0	HD	23,1# (23,1#)	16,3 (16,6#)	9,9 (12,5#)	6,9 (9,5#)				
- 7,5	HD		11,9# (11,9#)	8,8# (8,8#)					
- 9,0	HD								
-10,5	HD								

The load values are quoted in tons (t) on the backhoe bucket's load hook, and may be swung 360° on firm and even ground. Values quoted in brackets apply to the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the backhoe bucket's lifting eye is 27 t. Without bucket (2,00 m³), the lift capacities will increase by 2250 kg, without bucket cylinder, link and lever they increase by an additional 750 kg. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.

Lift Capacities

with Gooseneck Boom 7,60 m and Heavy Counterweight

Stick 2,35 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD				7,9# (7,9#)	6,6# (6,6#)			
6,0	HD				8,6# (8,6#)	7,5 (7,7#)			
4,5	HD		18,4# (18,4#)	12,3# (12,3#)	9,7# (9,7#)	7,2 (8,2#)			
3,0	HD			12,6 (14,3#)	9,1 (10,8#)	6,8 (8,8#)	5,1 (7,3#)		
1,5	HD			11,7 (15,5#)	8,5 (11,6#)	6,4 (9,4#)	4,9 (7,9#)		
0	HD		10,9# (10,9#)	11,3 (15,9#)	8,2 (12,1#)	6,2 (9,7#)			
- 1,5	HD	11,5# (11,5#)	18,2 (18,2#)	11,3 (15,6#)	8,0 (12,1#)	6,1 (9,6#)			
- 3,0	HD	18,7# (18,7#)	18,5 (18,7#)	11,4 (14,6#)	8,1 (11,4#)	6,2 (8,9#)			
- 4,5	HD	20,4# (20,4#)	16,2# (16,2#)	11,8 (12,7#)	8,4 (9,9#)				
- 6,0	HD		12,0# (12,0#)	9,3# (9,3#)					
- 7,5	HD								
- 9,0	HD								
-10,5	HD								

Stick 2,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD					6,7# (6,7#)			
6,0	HD				7,9# (7,9#)	7,1# (7,1#)	4,3# (4,3#)		
4,5	HD		16,1# (16,1#)	11,3# (11,3#)	9,0# (9,0#)	7,2 (7,7#)	5,3 (6,9#)		
3,0	HD		11,2# (11,2#)	12,9 (13,4#)	9,2 (10,2#)	6,8 (8,4#)	5,1 (7,3#)		
1,5	HD		8,4# (8,4#)	11,9 (15,0#)	8,6 (11,2#)	6,4 (9,0#)	4,9 (7,6#)		
0	HD		11,8# (11,8#)	11,4 (15,7#)	8,1 (11,8#)	6,1 (9,4#)	4,7 (7,8#)		
- 1,5	HD	10,3# (10,3#)	16,8# (16,8#)	11,2 (15,7#)	7,9 (12,0#)	6,0 (9,5#)	4,7 (7,1#)		
- 3,0	HD	15,9# (15,9#)	18,2 (19,9#)	11,2 (15,0#)	7,9 (11,6#)	6,0 (9,1#)			
- 4,5	HD	21,9# (21,9#)	17,6# (17,6#)	11,5 (13,5#)	8,1 (10,4#)				
- 6,0	HD	18,2# (18,2#)	13,9# (13,9#)	10,7# (10,7#)					
- 7,5	HD								
- 9,0	HD								
-10,5	HD								

Stick 3,80 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5	12,0	13,5
12,0	HD								
10,5	HD								
9,0	HD								
7,5	HD					5,7# (5,7#)	4,0# (4,0#)		
6,0	HD					6,2# (6,2#)	5,6 (5,8#)		
4,5	HD				7,9# (7,9#)	6,8# (6,8#)	5,4 (6,2#)		
3,0	HD		17,7# (17,7#)	11,9# (11,9#)	9,2# (9,2#)	6,9 (7,6#)	5,1 (6,6#)	3,3# (3,3#)	
1,5	HD		13,0# (13,0#)	12,3 (13,9#)	8,7 (10,4#)	6,5 (8,4#)	4,9 (7,1#)	3,6# (3,6#)	
0	HD	4,9# (4,9#)	12,6# (12,6#)	11,5 (15,2#)	8,2 (11,3#)	6,1 (9,0#)	4,6 (7,4#)		
- 1,5	HD	8,8# (8,8#)	15,3# (15,3#)	11,1 (15,6#)	7,9 (11,8#)	5,8 (9,3#)	4,5 (7,6#)		
- 3,0	HD	12,8# (12,8#)	17,9 (19,5#)	11,0 (15,4#)	7,7 (11,7#)	5,8 (9,2#)	4,5 (7,3#)		
- 4,5	HD	17,4# (17,4#)	18,2 (19,4#)	11,2 (14,4#)	7,8 (11,1#)	5,8 (8,6#)			
- 6,0	HD	23,1# (23,1#)	16,6# (16,6#)	11,5 (12,5#)	8,1 (9,5#)				
- 7,5	HD		11,9# (11,9#)	8,8# (8,8#)					
- 9,0	HD								
-10,5	HD								

The load values are quoted in tons (t) on the backhoe bucket's load hook, and may be swung 360° on firm and even ground. Values quoted in brackets apply to the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the backhoe bucket's lifting eye is 27 t. Without bucket (2,00 m³), the lift capacities will increase by 2250 kg, without bucket cylinder, link and lever they increase by an additional 750 kg. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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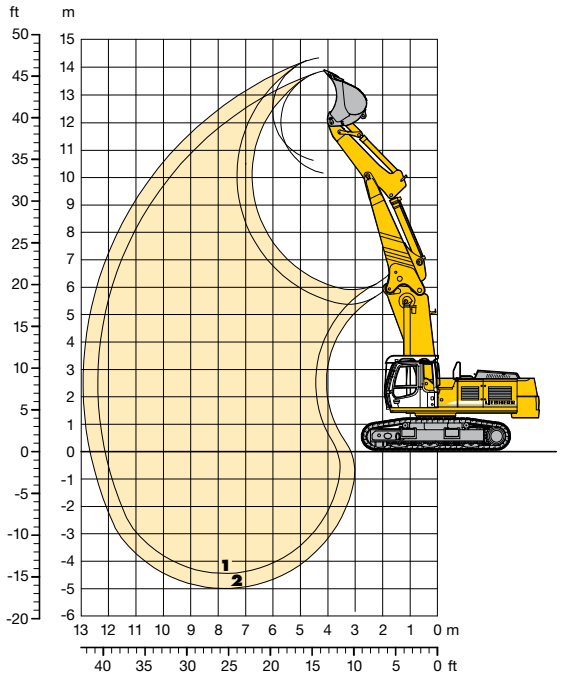
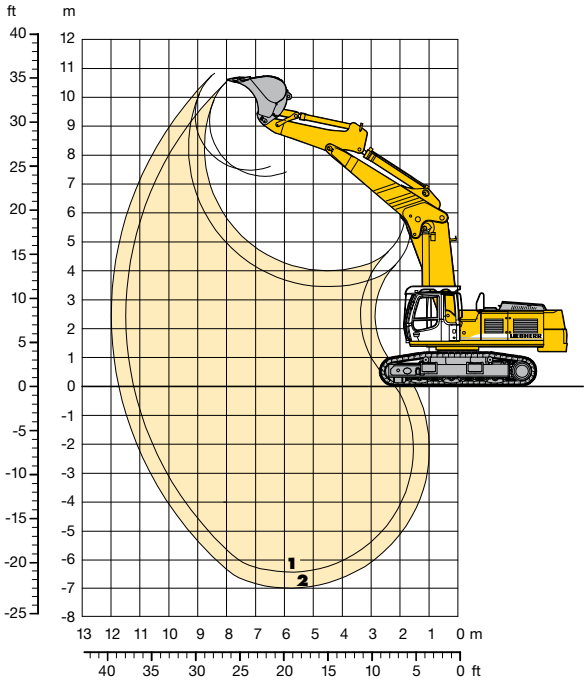
Backhoe Attachment

with Main Boom 4,60 m





For backhoe application, following items are required

Main boom 4,60 m
Stick HD 2,35 m
Stick HD 2,90 m
Storage racks for backhoe attachment

Optional
Hydraulic lines AHS* for basic boom 4,60 m
Hydraulic lines AHS* for stick HD 2,35 m
Hydraulic lines AHS* for stick HD 2,90 m
Hydraulic lines rotary drive for for basic boom 4,60 m
Hydraulic lines rotary drive for stick HD 2,35 m
Hydraulic lines rotary drive for stick HD 2,90 m
Backhoe bucket - as required

* AHS = hydraulic control for hydraulic accessory

Digging Envelope Main Boom pinned in upper (in lower) bearing

		1	2
Stick lengths	m	2,35	2,90
HD-Undercarriage			
Max. digging depth	m	4,50 (6,40)	5,05 (6,95)
Max. reach at ground level	m	12,15 (11,20)	12,70 (11,70)
Max. dump height	m	10,15 (7,25)	10,60 (7,50)
Max. teeth height	m	13,85 (10,55)	14,35 (10,80)
S-HD-Undercarriage			
Max. digging depth	m	4,35 (6,20)	4,95 (6,75)
Max. reach at ground level	m	12,10 (11,15)	12,65 (11,65)
Max. dump height	m	10,30 (7,40)	10,75 (7,65)
Max. teeth height	m	14,05 (10,75)	14,50 (11,00)
V-Undercarriage			
Max. digging depth	m	4,45 (6,35)	5,00 (6,90)
Max. reach at ground level	m	12,10 (11,20)	12,65 (11,70)
Max. dump height	m	10,20 (7,30)	10,65 (7,55)
Max. teeth height	m	13,90 (10,60)	14,40 (10,85)
VH-HD-Undercarriage			
Max. digging depth	m	4,35 (6,25)	4,90 (6,80)
Max. reach at ground level	m	12,10 (11,15)	12,65 (11,70)
Max. dump height	m	10,30 (7,35)	10,75 (7,60)
Max. teeth height	m	14,05 (10,70)	14,50 (10,95)
Digging force SAE	kN/t	196/20,0	164/16,7
Digging force ISO	kN/t	205/20,9	170/17,3
Breakout force SAE	kN/t	225/22,9	195/19,9
Breakout force ISO	kN/t	245/24,9	215/21,9

Max breakout force ISO 274,3 kN (28,0 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with counterweight 9,0 t, main boom 4,60 m, stick HD 2,35 m and backhoe bucket HD 2,00 m³ (2770 kg).

Undercarriage		HD	S-HD	V	VH-HD
Pad width	mm	600	600	600	600
Weight	kg	53700	56800	58300	67800
Ground pressure	kg/cm²	0,95	1,00	1,05	1,12

Backhoe Bucket[1)]

Cutting width	mm	1350	1550	1750	1950
Capacity ISO 7451	m³	1,65	2,00	2,35	2,70
Max. material weight					
HD-Undercarriage	t/m³	1,8	1,5	1,2	–
S-HD-Undercarriage	t/m³	1,8	1,8	1,2	–
V-Undercarriage	t/m³	1,8	1,8	1,5	–
VH-HD-Undercarriage	t/m³	1,8	1,8	1,8	1,8
Weight HD backhoe bucket	kg	2600	2770	3000	3300
For machine stability per ISO 10567 the max. stick length is:					
HD-Undercarriage	m	2,35	2,35	2,35	–
S-HD-Undercarriage	m	2,90	2,35	2,35	–
V-Undercarriage	m	2,90	2,35	2,35	–
VH-HD-Undercarriage	m	2,90	2,90	2,90	2,35

[1)] with Esco teeth 61 (appropriate for materials above classification 6, per VOB, Section C, DIN 18300)

perienced member of staff.

- As far as possible, monitor personnel to ensure that they are adhering to safe working practices, are aware of risks and are observing the operating instructions.
- Wear safe work clothes when you are working on or with the machine. Avoid wearing rings, watches, ties, scarves, open jackets and loose clothing. There is a risk of injury from, for example, becoming stuck or being drawn in.
- Protective goggles, safety helmets, safety shoes and gloves, reflective vests and ear protection etc. are required for specific jobs.
- Ensure that you obtain information on any special safety regulations for the job site from the site foreman.
- Always tilt up the safety lever before leaving the operator's seat.
- When getting in and out, do not hold on to the steering column, control panel or joystick. Doing this could cause unintentional movement, which could result in an accident.
- Never jump from the machine; use the steps, ladders, gangplanks and supporting straps provided for this purpose.
- Face the machine when getting in or out and always use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
- Familiarize yourself with the location of the emergency exit through the front window.
- In the absence of any other instructions, proceed as follows for all maintenance and repair work:
  - switch off the machine on firm, level ground and anchor the grab in the ground.
  - place all operating levers into neutral and tilt the safety lever up.
  - switch off the engine and remove the start key.
- Before touching any parts of the hydraulic circuits, you must also operate all pilot control devices (joystick and pedals) in all directions with the start key in contact position in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.
- Secure all loose parts on the machine.
- Never operate a machine before carrying out a careful inspection tour and checking whether any warning signs are missing or illegible.
- Respect all danger and safety instructions.
- For special applications the machine must be equiped with specific safety equipments. Work only if they are mounted and functional.
- Do not carry out any modifications, alterations or conversions to the machine which may affect safety without the express permission of the manufacturer. This also applies for the installation of safety devices and valves and for welding work on load-bearing parts.
- It is forbiden to repair the cab.
- Not original equipment and component parts or such kind, wich has generaly not been validated by LIEBHERR for installation or extension, has not to be installed or added onto the excavator without previous written agreement of LIEBHERR. Wherefore the necessary technical documentations has to be at LIEBHERR's disposal.

2.3.2 Avoidance of crushing and burns

- Do not work beneath the equipment if it is not safely positioned on the ground or supported.

3 Control and operation

3.1 Operating and control elements

3.1.1 Controls in the operator's cab

1	Safety lever- Servo control	**S5L**	Push button for rotating device left (grapple, shear, ...), *or unlocking of cylinder cut-off (NA)*
3	Right joystick	**S5M**	Horn
4	Left joystick	**S5R**	Push button for rotating device right (grapple, shear, ...) *or travel alarm on/off (NA)*
5	Pedal for left travel gear	**S6L**	Push button for roof window wiper *or rotating device left (NA)*
6	Pedal for right travel gear	**S6M**	Push button for roof window washer
9	Pedal for special attachment control *	**S6R**	Push button –travel alarm on/off *or rotating device right (NA)*
10	Positioning swing brake *	**S55**	Switch – unlocking of cylinder cut-off *or lifting magnet (NA)*
15	Controls for optional equiments *	**S57**	Switch / Preselection of swing brake operating mode
		S71	Diesel engine emergency start
H1	Monitoring display	**S72**	RPM adjustment during emergency operation
H10	Buzzer	**S73**	Safety mode of the servo circuits
H130	Buzzer of the reach monitoring device	**S84-1**	Push button / Central lubrication
H131	Indicator of the reach monitoring device	**U38**	Control unit - air conditioner
P5	Hourmeter	**U117**	Control unit - reach monitoring device
S1	Ignition key		
S2	Control unit		

* Optional equiments

(NA) This location only for North America

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3.1.4 Monitoring display

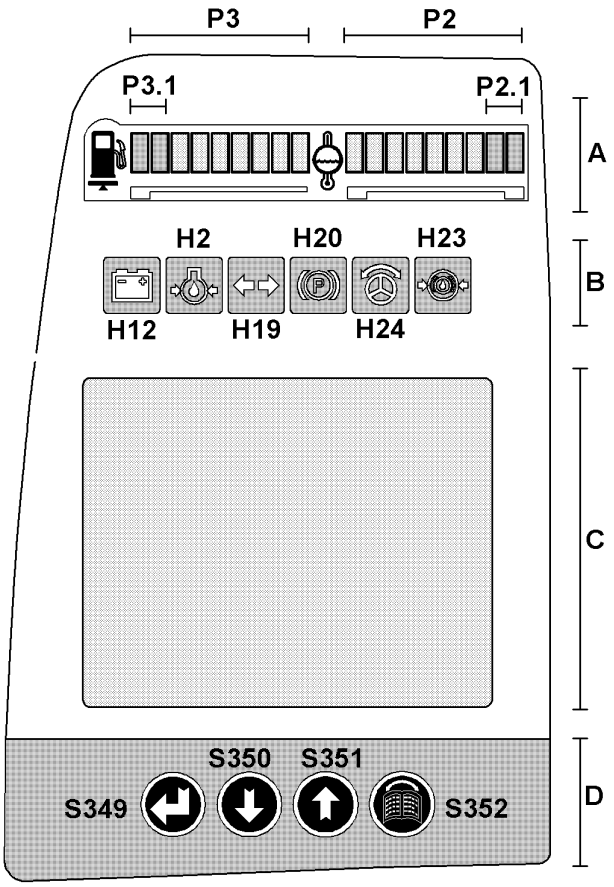

Fig. 3-5 *Monitoring display*

A	Analog-value display	**H24**	No function
B	Indicator lights	**P2**	Coolant temperature display
C	LCD screen	**P2.1**	Coolant temperature display red area
D	Menu control buttons	**P3**	Fuel level display
H2	Indicator light, engine oil pressure	**P3.1**	Fuel level display red area
H12	Indicator light, battery	**S349**	Back button
H19	No function	**S350**	Down button
H20	No function	**S351**	Up button
H23	No function	**S352**	Menu button

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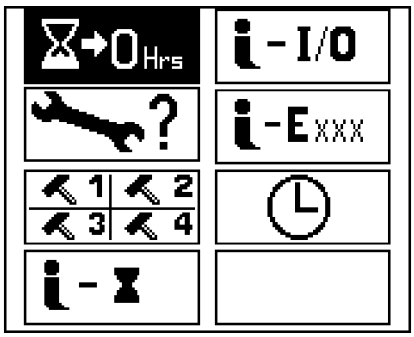


Fig. 3-9 *List of menus.*

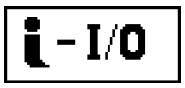
To select a menu:

▶ Press arrow key **Down** or **Up**.
↳ The following or previous menu will be displayed on the screen with a black background.

❑ If the desired menu is displayed with a black background, as an example here the **Reset daily operating hours** menu.

▶ Press the **Menu** key again.
↳ The sub-menu for the function selected is displayed.

▶ Press the **Back** key again.
↳ The sub-menu will be aborted.

Symbol of menu	Denomination of menu	Role of the menu
	Reset Data	Reset of daily operating hours counter
	Set Service	Confirmation of the execution of a recurring service work
	Set Option	Selection of the flow and pressure limitations relating to the mounted working tool (e.g. hammer)
	Info - Hours	Display of the operating hours of the machine components and general machine data.
	Info - In/Outputs	Information about the status of the hydraulic pumps and of the electrical inputs and outputs
	Info - Errors	Memory of the stored operating faults and electrical system errors
	Set Clock	Setting of the clock

The screen displays the list of all electrical errors with their error code.

The “Test” column displays the number of errors which have occurred since the last deletion.

The hour information "reset test at x Hrs" (e g. 12 Hrs) indicates the operating hour in which the "Test" column was the last time deleted.

▶ Press the **Back** key to return to the first page of the sub-menu.

▶ Press the **Down** key and then the **Menu** key to confirm the new choice.

"list S-Exxx" : Operating faults in service mode

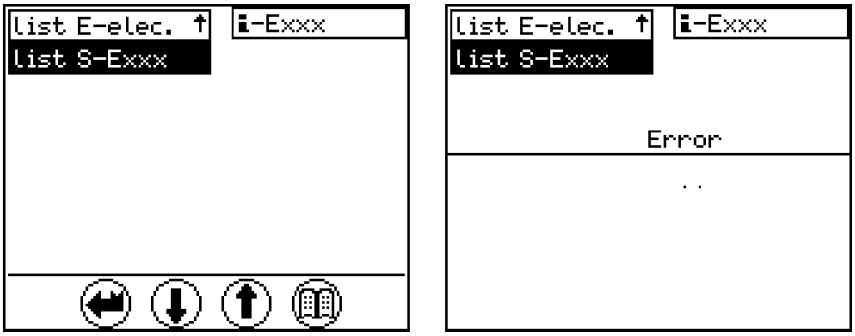


Fig. 3-23 *List of operating faults appeared in service mode*

No information will be displayed in this menu if the service connector is not connected.

❑ When a service connector is pluged in:

The submenu **list S-Exxx** lists all the operating faults, just like the submenu **list Exxx**, but this time only faults appeared in service mode, i. e. when a service connector was connected.

The sub-menu allows to separate the faults occuring during maintenance works,in particular during the troubleshootings.

For each error, an overview is shown and can be paged in just like for the "list Exxx" selection.

When exiting the service mode, the memory "list S-Exxx" is reset, the service mode operating faults are not stored.

Menu "set clock"

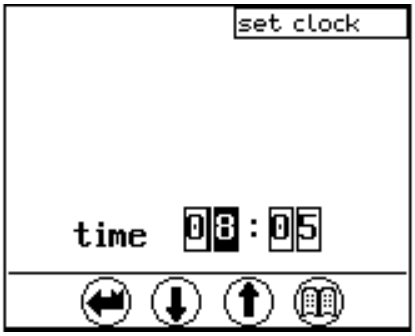


Fig. 3-24 *Clock setting*

▶ After selection of the function the digit completely right is inversely displayed.

▶ Press key **UP** or **DOWN** to adjust the selected digit.

▶ Press the **Menu** key.
  ↳ The current operating hour will be stored as the time for the last carrying out of a recurring service work.
  ↳ The operating hours indicating the next service due will be increased by the duration of a service interval (as an example they augment from 500 to 1000 working hours).

❑ If the service work has not been carried out.

▶ Press the **Back** key.
  ↳ The sub-menu will be aborted.

Menu "Set option" - selection of the flow and pressure limitations

This menu allows to allocate flow and pressure limitation options to external input I1 (choice of the maximum oil flows and system pressure depending on the mounted working tool).

In this menu, the operator can choose between 10 predefined options. For each option a pressure limitation and a flow limitation is assigned. When an option is chosen, the limitation values assigned to this option are effective as soon as the command of the optional tool is actuated (actuation of the foot pedal for hammer or grapple for example).

Caution!
Selecting a wrong option for a tool can damage it (for example: hydraulic hammer) or cause its restricted operation (for example: milling tool).

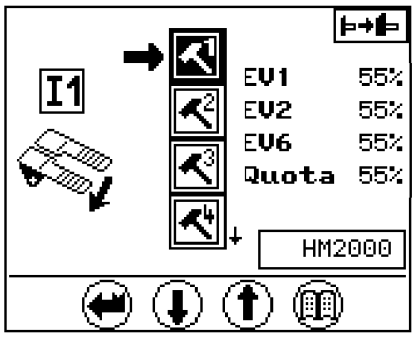


Fig. 3-30 *Menu "Set option"*

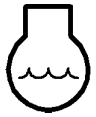
EV1 = Solenoid valve for oil flow limitation 1
EV2 = Solenoid valve for oil flow limitation 2
EV6 = Solenoid valve for pressure limitation
Quota = not used

The black field represents the active option.

▶ Press the **Up** or **Down** key.
  ↳ Another predefined option (1-10) can be assigned (e g. when work equipment is changed).

▶ Press the **Menu** key.
  ↳ The selection is confirmed. The new active option is displayed on a black background (in this example Option 1).
  ↳ At the same time the denomination that has been assigned to the option is displayed in the bottom right corner of the screen (in this example "HM2000").

5.3.4 Operating material chart

Designation	Medium	Symbol	Quantities* Liter / (USgal)
Fuel tank	Commercially available Diesel fuel withsulphur content between 0,05% and 0,5 %.		800 (211)
Diesel engine coolant	Anti-corrosion and antifreeze fluid		81 (21.5)
Windscreen washing system	Commercially available windscreen washing fluid or methylated alcohol	-	5,0 (1.3)
Refrigerating agent in air conditioning system	R 134 a	-	1,9 kg (4.5 lbs.)
Refrigerant oil in A/C compressor	PLANETELF PAG SP 20	-	0,21 (5 oz.)

Tab. 5-6 *Operating material chart*

* = Guide values

5.4 Lubricating and operating material specifications

5.4.1 Lubrication oil for the diesel engine

Lubricating oil requirements for diesel engines are based on the following classifications :

Classification	Specification
API classification (American Petrol Institute)	CI-4, CH-4, oil change interval reduced
ACEA (CCMC) - classification (Association des Constructeurs Européens de l´Automobile)	E4, E6, E7

Tab. 5-7 *Lubricating oil for the diesel engine*

Caution !
The use of a particle filter necessitates oil E6.

▶ Close the flap
↳ The fluid will distribute itself.

▶ Look at a light background through the eyepiece.

▶ Focus the scale and read off the value on the blue line.

Conversion diagram:

Note!
Concentration measured using a Brix refractometer for Caltex / Chevron Texaco / Havoline / Total.

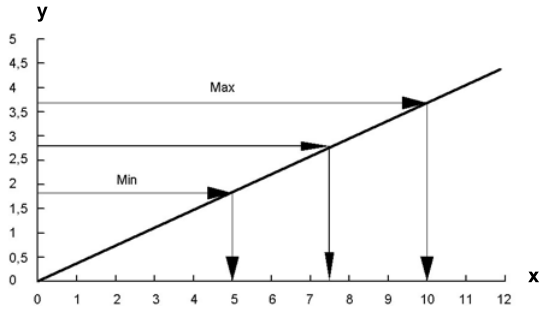


Fig. 5-12 *Conversion diagram*

x Concentration (vol%)
y Read off refractometer in 0-10% Brix

Overview of approved water soluble anti-corrosion fluids

Product description	Manufacturer
DCA 4 Diesel Coolant Additives	Fleetguard
Caltex CL Corrosion Inhibitor Concentrate	Caltex
Chevron Texaco Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	Arteco
Total WT Supra	Total

Tab. 5-12 *approved water-soluble anti-corrosion fluids*

Disposal

Undiluted anit-corrosion/anti-freeze fluids should be treated as special waste. Observe the local regulations when disposing of used coolant.

Regulations on fresh water quality

To prepare the coolant, use clean and not overly hard water. Usually, although not always, drinking water fulfils these requirements. Sea water, brackish water, brine and industrial wastewater are not suitable.

5.5.8 Heater flange

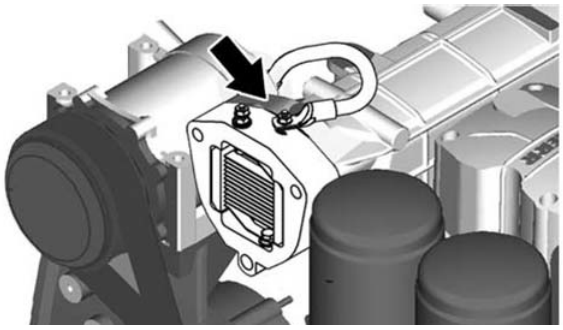


Fig. 5-20 Heater flange

- ▶ Switch off battery main switch and disconnect the negative cable from the battery.
- ▶ Disconnect the electrical cable on the heater flange.
- ▶ Connect the ohmmeter to the terminals and check the resistance.
- ▶ If a resistance value of $250^{\pm 10}$ mOhms at 20°C is not reached, the heater flange must be replaced.
- ▶ Reconnect the electrical cable on the heater flange, as well as the negative cable on the battery.

5.5.9 Checking and adjustment of valve clearance

Preparation

- ❑ It must be ensured that the Diesel engine is in the maintenance position and that new seals for all cylinder head covers are on-hand.

Note !

- – The cylinder number 1 is always situated on the flywheel side.
- – The sense of rotation of the engine is counterclockwise when facing the flywheel.
- – For each cylinder, exhaust valves are on the flywheel side and intake valves on fan side.

- ▶ Dismount the cylinder head covers.
- ▶ Attach the manual engine slewing device to the stater gear ring, see also the paragraph "starter ring gear lubrication".
- ▶ Turn the engine in its sense of rotation until exhaust and intake valves overlap at the cylinder opposite to the cylinder to be adjusted.

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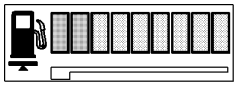
To drain the fuel tank and the fuel system daily:

- ▶ Place a suitable container underneath.
- ▶ Unscrew the drain valve **36** found on the underside of the fuel tank.
- ▶ Drain off the water until fuel starts to come out.
- ▶ Screw drain valve **36** closed again.

If conditions of use and fuel quality permit, the maintenance interval can be increased to one week.

Note!
To reduce the formation of condensate in the tank, keep the fuel level as high as possible.



Display **P3** indicates the fuel level.

When the red bar **P3.1** illuminates, a low reserve quantity is still in the tank.

In the event of a low fuel level, refill the tank before starting to work.

5.6.4 Emptying and cleaning the fuel tank

The tank floor is fitted with a drain valve **36**.

- ▶ Place a suitable container underneath.
- ▶ To drain off the water, unscrew the drain plug on the drain valve **36** by two turns until fuel which contains no water comes out.
- ▶ Retighten the plug.
- ▶ To empty, remove the fuel filler cap **15** and the drain valve **36** and collect the fuel in a suitable container.
- ▶ Check the fuel tank and fill strainer **20** regularly for contamination.
- ▶ If necessary, replace the fill strainer **20** and / or wash out the fuel tank.

(with the ignition key in the contact position).

To depressurize the hydraulic tank

▶ Unscrew the vent filter **1** by a **maximum** of one turn.
↳ The hydraulic tank will depressurize.

The vent filter **1** can be turned manually if safety stud **2** is inserted. An open-ended spanner can be used if the filter does not open easily

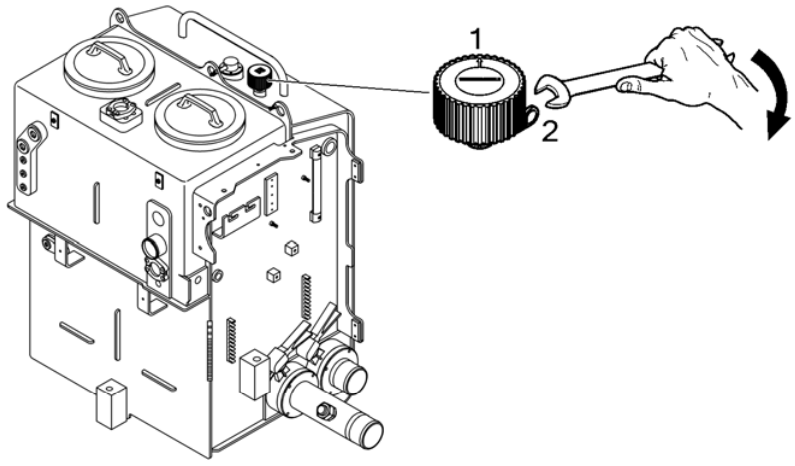


Fig. 5-43 *Depressurizing the hydraulic tank*

.

Note!

▶ The retaining pin **2** (or anti vandalism key) must be systematically removed from the vent filter **1** and hung with the ignition key.

Danger!
The hydraulic oil is hot when at operating temperature and could be pressurized.

▶ Do not allow the hot oil or oil-bearing parts to touch the skin.

5.8.2 Checking the oil level, emptying and refilling the hydraulic tank

Machine position

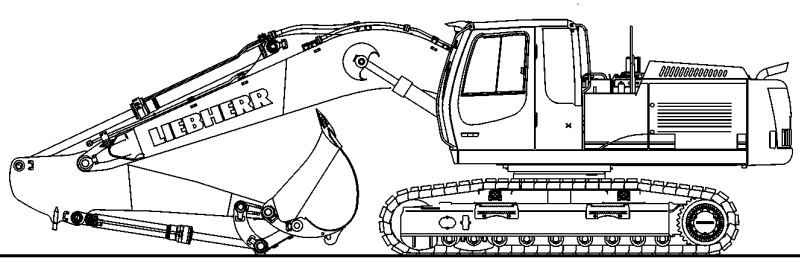


Fig. 5-44 *Machine position for checking the oil level in the hydraulic tank*

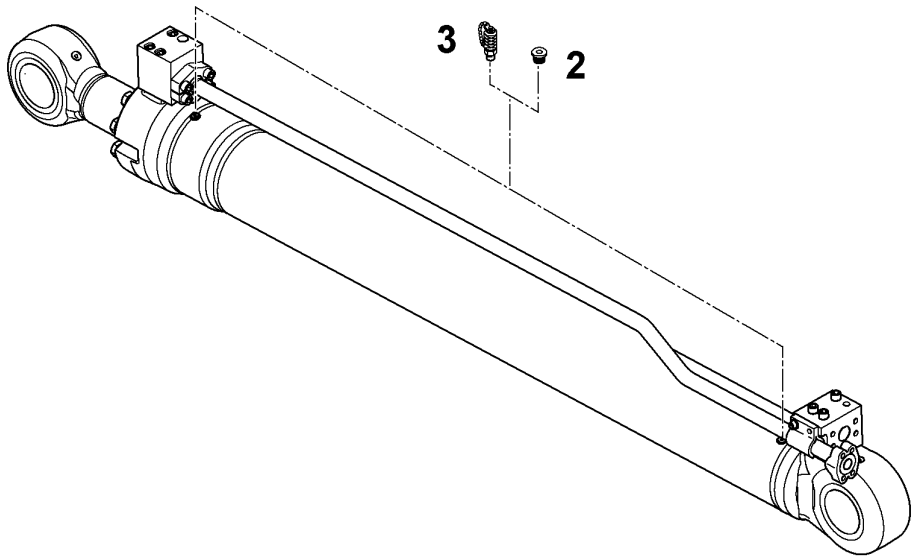


Fig. 5-54 *Hydraulic cylinder bleeding*

2 Bleeder plug **3** Gauge coupling

Hydraulic cylinders fitted with bleeder plugs **2** must be bled according to the procedure 1 below and hydraulic cylinders without these bleeder plugs according to the procedure 2.

Procedure 1

- ▶ Unscrew the bleeder plugs **2 on** both sides of the cylinder.
- ▶ Screw in gauge couplings **3** into bleeder holes and fit each coupling with a test hose.
- ▶ Start the engine and keep it running at low idle (800-900 RPM).
- ▶ If possible, move the attachment in such a way the cylinder side to be bled is in the higher position.
- ▶ Carefully actuate the cylinder. It is recommended to bleed first the side, which does not necessitate a displacement of the cylinder (for example, if the cylinder is already retracted, first actuate the cylinder retraction in order to bleed the cylinder rod side).
  Continue until oil free of air bubbles flows out of the test hose.
- ▶ Supply the other side of the cylinder and bleed it.
- ▶ Switch off the engine, remove the test hoses and replace the gauge couplings **3** by the bleeder plugs **2**.
- ▶ Perform the procedure 2.

Procedure 2

- ▶ Start the engine and keep it running at low idle (800-900 RPM).
- ▶ Slowly and regularly extend the cylinder until stop, then slowly and regularly retract it all the way to the stop. Repeat the operation 5 times. .

The incorrect bleeding can cause the appearance of gas bubbles (mixture of air and hydrocarbon) which could explode due to the high pressure in the cylinder (Diesel effect).

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5.9.4 Splitterbox - Oil change

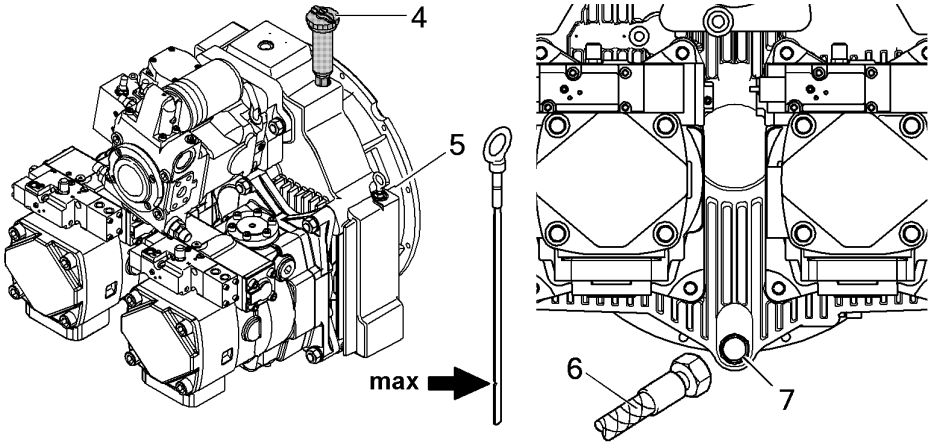

Fig. 5-64 *Changing the oil in the splitterbox*

4 Cover
5 Dipstick
6 Drain hose
7 Drain valve

To check the oil level:

▶ Check the oil level at the dipstick **5**, a few minutes after turning off the engine, to allow the oil to collect in the sump of the splitterbox.

To drain the oil:

▶ Remove the cover **4**.

▶ Screw the drain hose provided **6** to the drain valve **7** and let the oil flow out into a suitable container.

▶ Remove the hose **6**.

▶ Screw the cover of the drain valve **7** back on.

To add the oil:

▶ Add the oil via the filler tube under the cover **4** until the level reaches the marking "Max" on the dipstick **5**.

▶ Screw the cover **4** back on.

▶ Run the engine for a few minutes, stop it and recheck the oil level after a short time.

5.10 The track components

The tracks are maintenance-free until their components must be replaced when their wear limits have been reached.

The lifetime design of the carrier rollers, track rollers and idlers increases the life expectancy of the track drives and slipring seals make them insensitive to dirt.

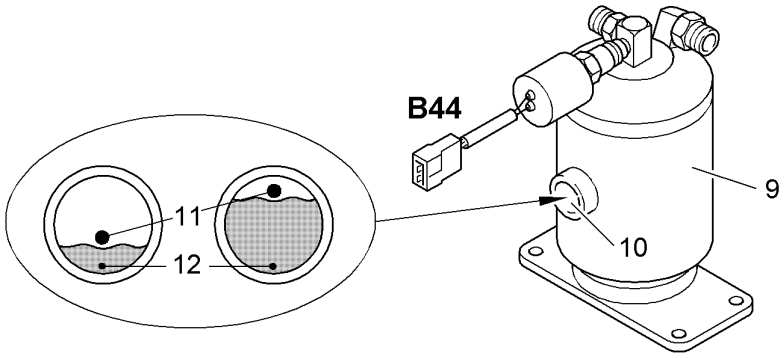

Fig. 5-77 *Dryer-accumulator unit*

To check the dryer-accumulator unit:

▶ With the diesel engine running and the air-conditioning system switched on, check the refrigerant level in the inspection glass **10** of dryer-accumulator unit **9**.

Note!
If there is insufficient refrigerant, the white float **11** lays at the bottom of the inspection glass.

▶ If the cooling effect is diminishing, have the system refilled by a refrigeration engineer.

▶ Determine the degree of moisture of the desiccant in dryer-accumulator unit **9**.

▶ To do this, observe the colour of the indicator pearl **12** in the inspection glass.

If the pearl is orange, the degree of moisture in the coolant circuit is OK. If, however, the pearl is not coloured, the dryer-accumulator unit is saturated with moisture.

▶ Change dryer-accumulator unit **9** immediately.

▶ Perform a visual check on the condition of dryer-accumulator unit **9**.

▶ If it is observed that dryer-accumulator unit **9** is rusted or damaged (e g. on the panel fastening or on the hose connection), replace dryer-accumulator unit **9** (pressure tank).

In the two cases referred to above and at least once a year, have the dryer-accumulator unit **9** replaced by a fitter trained in refrigeration engineering.

The coolant circuit must be emptied, checked for leaks and refilled. Check for abrasion, replace and if necessary retighten the hose connections on the hoses.

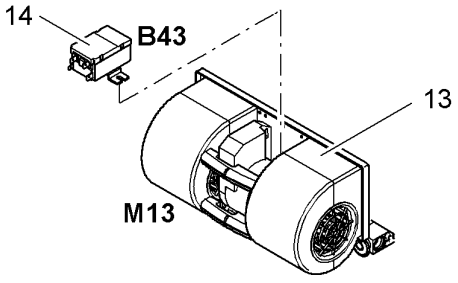

Fig. 5-78 *Fan motor on the heating/air-conditioning device*

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tra)

The mechanical quick-change adapter is not lubricated via the central greasing system. The bearing points must be greased using the grease gun.

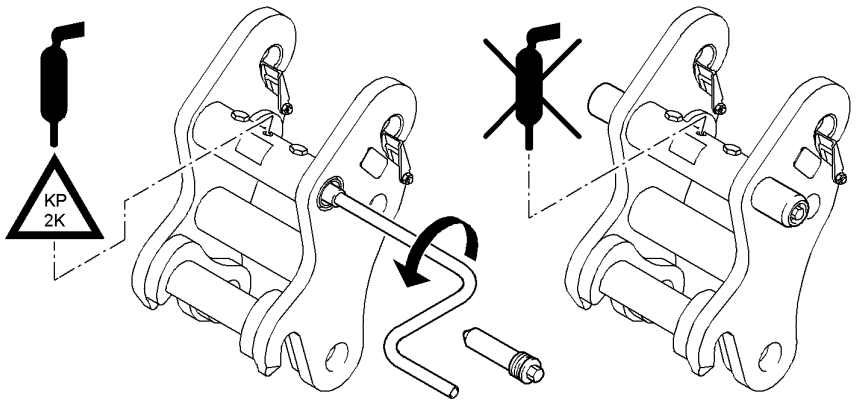


Fig. 5-87 *Greasing the mechanical quick-change adapter*

▶ Grease the bearing points via the lubricating nipple using a grease gun.

Grease quality: see “Lubricating and operating materials”

Note!
If the mechanical quick-change adapter is greased when the pin is drawn out, the hollow area between the locking pins fills with greaseand the pins can no longer be reinserted.

▶ Ensure that the locking pins are inserted when greasing.

5.13 Quick-change systems

5.13.1 Hydraulic quick-change adapter (optional extra)

Greasing the quick-change adapter

The hydraulic quick-changeadapter is not lubricated via the central greasing system. The bearing points must be greased using the grease gun.

Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 954 C		
On delivery	Every 8 - 10	Every 10 - 50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
			❍	❍	❍	Replace replenishing oil filter on swing pump		
			❍	❍	❍	Check mounting screws of components		
			❍	❍	❍	Check and clean hydraulic oil cooler and ventilator fan		4)
			❍	❍	❍	Drain off water in hydraulic tank (when using environmentally friendly fluids, max. permissible water content is 0.1 % , fit hydraulic system with bypass oil filter and take oil samples)		
			❍	❍	❍	If mounted check return filter for hydraulic hammer for cleanliness, replace element if necessary		
			❑	❍	❍	Replace filter elements in return filter (first time at 500 hours)		2)
			❑	❍	❍	Clean or replace filter element of leak oil filter (first time at 500 hours) Replacement necessary after max. 3 cleanings		2)
			❑	❍	❍	If mounted, replace bypass oil filter element (first time at 500 op. hours / atleast every 500 hours)		2)
				❍	❍	Check hydraulic system for leaks and function		
				❍	❍	Check / adjust servo, primary and secondary pressures		
					❍	Replace hydraulic oil (or optimize intervals according to oil sample analysis reports)		2), 3)
					❍	Bleed servo system and hydraulic pumps (after replacing oil)		
					❍	Replace breather filter on hydraulic tank		2)
ELECTRICAL SYSTEM								
❍	●	●	❍	❍	❍	Check indicator lights and gauges on control panel when starting		
❍				❍	❍	Check head and floodlights		
			❍	❍	❍	Check level and specific gravity of electrolyte in the batteries		
			❍	❍	❍	Check and clean batteries terminals		
			❍	❍	❍	Spray slip rings of electrical rotary connection (if mounted) with Cramolin contact spray		
❍				❍	❍	Check system and components for function		
SWING GEAR								
❍			❍	❍	❍	Check oil level and for leaks		

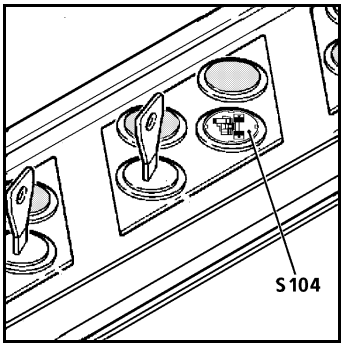
Tab. 5-18

1. Adjusting the track gauge of the undercarriage

DANGER

Do not allow any unauthorised persons to remain within immediate proximity of the undercarriage during the track gauge adjustment procedure.

1.1 Operating organs in the operator's cab for track width adjustment

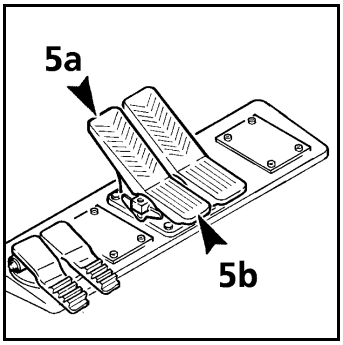


Adjustment of the undercarriage width is resulted via the left-hand foot pedal 5, while push-button S104 (fig. 25) on the rear control desk is held pressed at the same time. (Indicator lamp in the button lights up).

Pushing down the front of the left-hand pedal (5a) retracts the side frame.

Pushing down the rear of the left-hand pedal (5b) extends the side frame.

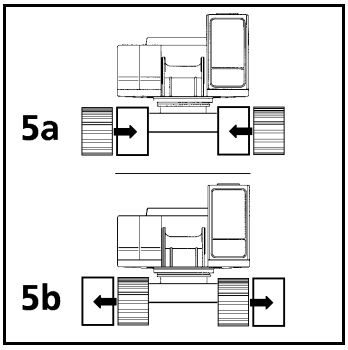
If a side frame does not extend or retract, the travel drive should be actuated briefly on the respective side, in both travel directions if necessary (actuate the foot pedal without holding the S104 button pressed).



Should a side frame remain immobile despite initiating these travel movements, discontinue the track gauge adjustment procedure and notify LIEBHERR After-Sales-Service.

CAUTION

Adjustment of the undercarriage width may only be resulted on firm, even underground, with the travel gear inactive.



The track width should only ever be adjusted to the point of both side frames reaching their stop positions (completely extended or retracted, as well as in the centre position if featured).

Working on, or travelling with, the machine while the side frame is set in the intermediate position (between the fixed points provided) is not permissible.

The undercarriage is to be manoeuvred into the retracted track gauge whenever the machine is going to be out of operation for an extended period.

1.2 Track width adjustment for "CVC" undercarriages

Operation of the excavator is only permitted when the undercarriage is in one of either end positions:

- **Minimum track width (side frame retracted):** provided exclusively for transport of the machine
- **Maximum track width (side frame extended):** provided for operation of the machine with attachment
- Before adjusting the track width, the machine is to be manoeuvred into one of the following four positions: